(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) Publication number : **0 603 845 A1**

(12) EUROPEAN PATENT APPLICATION

(21) Application number : **93120661.9**

(22) Date of filing : **22.12.93**

(51) Int. Cl.[5] : **A01N 43/653,**
// (A01N43/653, 43:653, 47:38, 55:00, 37:32, 47:20, 47:34, 47:18, 43:52, 43:78, 47:20)

(30) Priority : **25.12.92 JP 358928/92**

(43) Date of publication of application :
29.06.94 Bulletin 94/26

(84) Designated Contracting States :
DE FR GB

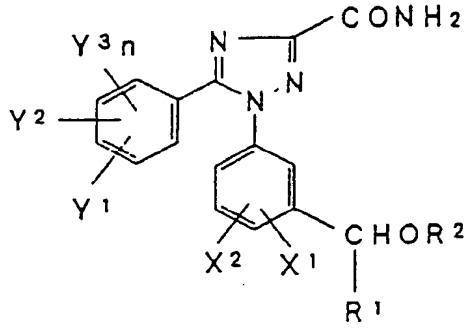
(71) Applicant : **KUREHA CHEMICAL INDUSTRY CO., LTD.**
9-11, Horidome-cho, 1-chome
Nihonbashi
Chuo-ku Tokyo 103 (JP)

(72) Inventor : **Tateishi, Hideaki**
Meijidanchi 30-9
Iwaki-shi, Fukushima-ken (JP)
Inventor : **Watanabe, Takeo**
78-31, Hananoi,
Nishiki-machi
Iwaki-shi, Fukushima-ken (JP)
Inventor : **Saishoji, Toshihide**
154-1, Harada, Nishiki-machi
Iwaki-shi, Fukushima-ken (JP)

(74) Representative : **Boeters, Hans Dietrich, Dr. et al**
Patentanwälte Boeters Bauer Koepe
Bereiteranger 15
D-81541 München (DE)

(54) Fungicide composition for agriculture and horticulture.

(57) A fungicidal composition for agriculture and horticulture use is disclosed. The composition comprises as effective components, at least one derivative of 1,5-diphenyl-1H-1,2,4-triazole-3-carboxamide represented by the following formula (I),



(I)

wherein R^1 is a C_1-C_6 alkyl group, a C_3-C_6 cycloalkyl group, a C_1-C_5 fluoroalkyl group, a (C_1-C_4 alkoxy)methyl group or a phenyl group, R^2 is a C_1-C_8 alkyl group, a (C_3-C_6 cycloalkyl)methyl group or a C_2-C_5 fluoroalkyl group, X^1 represents a hydrogen atom, a C_1-C_4 alkyl group, a C_1-C_4 alkoxy group or a halogen atom, X^2, Y^1 and Y^2 independently represents a hydrogen atom, a C_1-C_4 alkyl group or a halogen atom, Y^3 is a hydrogen atom or a halogen atom, and n denotes 1 or 2, and

at least one fungicidal compound selected from the group consisting of ergosterol biosynthesis-inhibitive type compounds, carboximide compounds, benzimidazole compounds and carbamate compounds.

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BACKGROUND OF THE INVENTION

Field of the Invention

The present invention relates to a fungicide composition for agriculture and horticulture, and, more particularly, to a fungicide composition for agriculture and horticulture comprising at least one derivative of 1,5-diphenyl-1H-1,2,4-triazole-3-carboxamide and at least one fungicide compound selected from the group consisting of ergosterol biosynthesis-inhibitive type fungicide compounds, carboximide fungicide compounds, benzimidazole fungicide compounds and carbamate fungicide compounds, as effective components.

Description of Background Art

Effectiveness of derivatives of 1,5-diphenyl-1H-1,2,4-triazole-3-carboxamide as a herbicidal agent is known by EP-A-282 303, EP-A-282 669 and EP-A-220 956. EP-A-0 552 558 describes that a derivative of 1,5-diphenyl-1H-1,2,4-triazole-3-carboxamide can be used as an effective component of fungicidal agents.

Among various diseases of plants, those induced by external causes and very difficult to prevent, such as gray mold disease, require a great amount of drugs for the prevention. The use of a great amount of drugs tends to produce drug-resistant fungi. Impaired effects of drugs due to the drug-resistant fungi are a worldwide problem.

Development of a fungicidal composition for agriculture and horticulture use which surely exhibits a certain effect at a small amount has been desired.

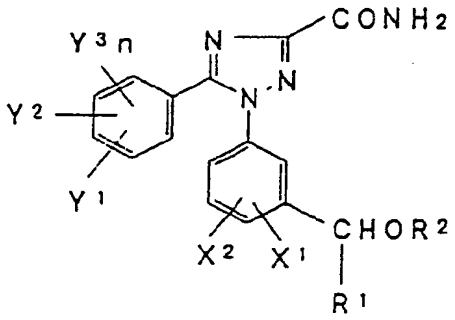
The object of the present invention is therefore to provide a fungicidal composition for agriculture and horticulture use which surely exhibits a certain effect at a small amount.

As a result of extensive studied, the present inventors found that the use of at least one derivative of 1,5-diphenyl-1H-1,2,4-triazole-3-carboxamide represented by the following formula (I) in combination with at least one fungicidal compound selected from the group consisting of ergosterol biosynthesis-inhibitive type fungicidal compounds, carboximide fungicidal compounds, benzimidazole fungicidal compounds and carbamate fungicidal compounds exhibits a superior synergistic effect. This finding has led to the completion of the present invention.

SUMMARY OF THE INVENTION

The above object is solved according to the present invention by a fungicidal composition for agriculture and horticulture use, which comprises as effective components,

at least one derivative of 1,5-diphenyl-1H-1,2,4-triazole-3-carboxamide represented by the following formula (I),



(I)

wherein R^1 is a C_1-C_6 alkyl group, a C_3-C_6 cycloalkyl group, a C_1-C_5 fluoroalkyl group, a (C_1-C_4 alkoxy)methyl group or a phenyl group, R^2 is a C_1-C_8 alkyl group, a (C_3-C_6 cycloalkyl)methyl group, a C_2-C_5 fluoroalkyl group, a (C_1-C_4 alkoxy)(C_1-C_4 alkyl) group, a phenyl group, a phenylmethyl group or a phenylmethyl group substituted by a C_1-C_4 alkyl group or a halogen atom, X^1 represents a hydrogen atom, a C_1-C_4 alkyl group, a C_1-C_4 alkoxy group or a halogen atom, X^2 represents a hydrogen atom, a C_1-C_4 alkyl group or a halogen atom, Y^1 is a hydrogen atom, a halogen atom, a C_1-C_4 alkyl group, a C_1-C_4 alkoxy group, a C_1-C_4 fluoroalkoxy group, a HO group, a HOOC group or a (C_1-C_4 alkoxy)carbonyl group, Y^2 is a hydrogen atom, a C_1-C_4 alkyl group or a halogen atom, Y^3 is a hydrogen atom or a halogen atom, and n denotes 1 or 2, and

at least one fungicidal compound selected from the group consisting of ergosterol biosynthesis-inhibitive type fungicidal compounds, carboximide fungicidal compounds, benzimidazole fungicidal compounds and carbamate fungicidal compounds.

Other objects, features and advantages of the invention will hereinafter become more readily apparent from the following description.

DETAILED DESCRIPTION OF THE INVENTION AND PREFERRED EMBODIMENTS

Carboxamide derivatives represented by the above formula (I) used in the present invention are compounds described in EP-A-0 552 558.

In the descriptions below the derivatives of 1,5-diphenyl-1H-1,2,4-triazole-3-carboxamide of formula (I) are collectively referred to as "group A compounds", and the ergosterol biosynthesis-inhibitive type fungicidal compounds, carboximide fungicidal compounds, benzimidazole fungicidal compounds and carbamate fungicidal compounds which are used in combination with group A compounds are collectively referred to as "group B compounds".

Given as specific examples of group A compounds are compounds listed in Table 1. Physicochemical characteristics of these compounds are given in Table 2.

.ls1

TABLE 1

Compound No.	Substituents R^1 / R^2	X^1 / X^2	Y^1 Y^2 Y^3 / n
A-1	cyclopropyl	H	H H
	$n-C_4H_9$	H	H
A-2	cyclopentyl	H	H H
	$n-C_4H_9$	H	H
A-3	$t-C_4H_9$	H	2-F H
	$n-C_4H_9$	H	H
A-4	$t-C_4H_9$	H	H H
	$n-C_4H_9$	H	H
A-5	$t-C_4H_9$	H	H H
	$PhCH_2$	H	H
A-6	$n-C_3F_7$	$6-CH_3$	H H
	$n-C_4H_9$	H	H
A-7	C_2F_5	H	H H
	$n-C_4H_9$	H	H
A-8	CF_3	H	H H
	$n-C_4H_9$	H	H
A-9	$n-C_4H_9$	H	H H
	$n-C_4H_9$	H	H
A-10	$n-C_3H_7$	H	H H
	$n-C_4H_9$	H	H

TABLE 1 (Continued)

Compound No.	Substituents R^1 / R^2	X^1 / X^2	Y^1 / Y^2 / $Y^3{}_n$
A-11	C_2H_5	6-CH_3	2-F 3-F
	n-C_4H_9	H	H
A-12	C_2H_5	6-CH_3	2-F H
	n-C_4H_9	H	H
A-13	C_2H_5	6-CH_3	2-F 5-F
	n-C_4H_9	H	H
A-14	C_2H_5	H	H H
	n-C_4H_9	H	H
A-15	C_2H_5	6-CH_3	H H
	n-C_4H_9	H	H
A-16	C_2H_5	H	H H
	n-C_3H_7	H	H
A-17	C_2H_5	H	H H
	i-C_4H_9	H	H
A-18	i-C_4H_9	H	H H
	n-C_4H_9	H	H
A-19	CH_3OCH_2	6-CH_3	H H
	n-C_4H_9	H	H
A-20	CH_3	H	H H
	(n-C_3F_7)CH_2	H	H

TABLE 1 (Continued)

Compound No.	Substituents R^1 / R^2	X^1 / X^2	Y^1 Y^2 $Y^3{}_n$
A-21	CH_3	H	H H
	n-C_6H_{13}	H	H
A-22	CH_3	H	H H
	n-C_5H_{11}	H	H
A-23	CH_3	H	2-F H
	n-C_4H_9	H	H
A-24	CH_3	6-Cl	3-F 5-F
	n-C_4H_9	H	H
A-25	CH_3	6-Cl	2-F H
	n-C_4H_9	H	H
A-26	CH_3	6-Cl	2-F 3-F
	n-C_4H_9	H	5, 6-F_2
A-27	CH_3	6-Cl	2-F 3-F
	n-C_4H_9	H	H
A-28	CH_3	6-Cl	2-F 5-F
	n-C_4H_9	H	H
A-29	CH_3	6-Cl	H H
	n-C_4H_9	H	H
A-30	CH_3	4-C_2H_5O	H H
	n-C_4H_9	H	H

TABLE 1 (Continued)

Compound No.	Substituents R^1 / R^2	X^1 / X^2	Y^1 Y^2 Y^3 n
A-31	CH_3	4-CH_3	H H H
	n-C_4H_9	H	
A-32	CH_3	4-Cl	H H H
	n-C_4H_9	H	
A-33	CH_3	6-CH_3O	H H H
	n-C_4H_9	H	
A-34	CH_3	6-Cl	H H H
	n-C_4H_9	H	
A-35	CH_3	6-CH_3	H H H
	n-C_4H_9	H	
A-36	CH_3	H	H H H
	n-C_4H_9	H	
A-37	CH_3	H	H H H
	n-C_3H_7	H	
A-38	CH_3	H	H H H
	i-C_5H_{11}	H	
A-39	CH_3	4-Cl	H H H
	CH_3	H	
A-40	CH_3	H	H H H
	CH_3	H	

TABLE 1 (Continued)

Compound No.	Substituents R^1 / R^2	X^1 / X^2	Y^1 Y^2 $Y^3{}_n$
A-41	s-C_4H_9	H	H H
	n-C_4H_9	H	H
A-42	i-C_3H_7	H	H H
	(cyclohexyl)CH_2	H	H
A-43	i-C_3H_7	H	2-F H
	n-C_5H_{11}	H	H
A-44	i-C_3H_7	H	H H
	n-C_5H_{11}	H	H
A-45	i-C_3H_7	H	2-CH_3 H
	n-C_4H_9	H	H
A-46	i-C_3H_7	H	3-CH_3 H
	n-C_4H_9	H	H
A-47	i-C_3H_7	H	4-CH_3 H
	n-C_4H_9	H	H
A-48	i-C_3H_7	6-CH_3	2-$COOCH_3$ H
	n-C_4H_9	H	H
A-49	i-C_3H_7	6-CH_3	2-COOH H
	n-C_4H_9	H	H
A-50	i-C_3H_7	H	2-Cl H
	n-C_4H_9	H	H

TABLE 1 (Continued)

Compound No.	Substituents R^1 / R^2	X^1 / X^2	Y^1 Y^2 $Y^3{}_n$
A-51	$i\text{-}C_3H_7$	H	2-Cl 6-F
	$n\text{-}C_4H_9$	H	H
A-52	$i\text{-}C_3H_7$	H	4-Cl H
	$n\text{-}C_4H_9$	H	H
A-53	$i\text{-}C_3H_7$	6-CH_3	2-F H
	$n\text{-}C_4H_9$	H	H
A-54	$i\text{-}C_3H_7$	6-CH_3	2-F 3-F
	$n\text{-}C_4H_9$	H	H
A-55	$i\text{-}C_3H_7$	H	2-F 4-F
	$n\text{-}C_4H_9$	H	H
A-56	$i\text{-}C_3H_7$	H	2-F 6-F
	$n\text{-}C_4H_9$	H	H
A-57	$i\text{-}C_3H_7$	H	2-F 3-F
	$n\text{-}C_4H_9$	H	H
A-58	$i\text{-}C_3H_7$	H	2-F H
	$n\text{-}C_4H_9$	H	H
A-59	$i\text{-}C_3H_7$	6-CH_3	2-F 5-F
	$n\text{-}C_4H_9$	H	H
A-60	$i\text{-}C_3H_7$	H	2-F 5-F
	$n\text{-}C_4H_9$	H	H

TABLE 1 (Continued)

Compound No.	Substituents R^1 / R^2	X^1 / X^2	Y^1 Y^2 $Y^3{}_n$
A-61	$i\text{-}C_3H_7$	H	3-F
			H
	$n\text{-}C_4H_9$	H	H
A-62	$i\text{-}C_3H_7$	H	3-F
			4-F
	$n\text{-}C_4H_9$	H	H
A-63	$i\text{-}C_3H_7$	6-CH_3	3-F
			5-F
	$n\text{-}C_4H_9$	H	H
A-64	$i\text{-}C_3H_7$	H	4-F
			H
	$n\text{-}C_4H_9$	H	H
A-65	$i\text{-}C_3H_7$	H	H
			H
	$n\text{-}C_4H_9$	H	H
A-66	$i\text{-}C_3H_7$	6-C_2H_5	H
			H
	$n\text{-}C_4H_9$	H	H
A-67	$i\text{-}C_3H_7$	6-CH_3	H
			H
	$n\text{-}C_4H_9$	H	H
A-68	$i\text{-}C_3H_7$	6-$i\text{-}C_3H_7$	H
			H
	$n\text{-}C_4H_9$	H	H
A-69	$i\text{-}C_3H_7$	6-Cl	H
			H
	$n\text{-}C_4H_9$	H	H
A-70	$i\text{-}C_3H_7$	H	2-CF_3O
			H
	$n\text{-}C_4H_9$	H	H

TABLE 1 (Continued)

Compound No.	Substituents R^1 / R^2	X^1 / X^2	Y^1 Y^2 $Y^3{}_n$
A-71	$i\text{-}C_3H_7$	H	2-C_2H_5O H
	$n\text{-}C_4H_9$	H	H
A-72	$i\text{-}C_3H_7$	H	2-CH_3O H
	$n\text{-}C_4H_9$	H	H
A-73	$i\text{-}C_3H_7$	H	3-CH_3O H
	$n\text{-}C_4H_9$	H	H
A-74	$i\text{-}C_3H_7$	H	4-CH_3O H
	$n\text{-}C_4H_9$	H	H
A-75	$i\text{-}C_3H_7$	H	H H
	$n\text{-}C_3H_7$	H	H
A-76	$i\text{-}C_3H_7$	H	H H
	$i\text{-}C_5H_{11}$	H	H
A-77	$i\text{-}C_3H_7$	H	H H
	$C_2H_5OC_2H_4$	H	H
A-78	$i\text{-}C_3H_7$	H	H H
	C_2H_5	H	H
A-79	$i\text{-}C_3H_7$	H	2-F H
	$PhCH_2$	H	H
A-80	$i\text{-}C_3H_7$	H	2-F 3-F
	$PhCH_2$	H	H

TABLE 1 (Continued)

Compound No.	Substituents R^1 / R^2	X^1 / X^2	Y^1 Y^2 $Y^3{}_n$
A-81	$i\text{-}C_3H_7$	H	2-F 5-F
	$PhCH_2$	H	H
A-82	$i\text{-}C_3H_7$	H	H H
	$PhCH_2$	H	H
A-83	$i\text{-}C_3H_7$	H	2-HO H
	$PhCH_2$	H	H
A-84	$i\text{-}C_3H_7$	H	H H
	$(2\text{-}CH_3\text{-}Ph)CH_2$	H	H
A-85	$i\text{-}C_3H_7$	H	H H
	$(4\text{-}Cl\text{-}Ph)CH_2$	H	H
A-86	$i\text{-}C_3H_7$	H	H H
	Ph	H	H
A-87	Ph	H	H H
	$n\text{-}C_4H_9$	H	H